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Assessing the impact of green vegetation fraction from different vegetation indices on land surface processes in Brazilian Amazonia

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Land surface schemes in weather and climate models are responsible for the partition of the available surface energy between latent and sensible heat fluxes, and atmosphere-land surface interactions. In land surface schemes, the heat fluxes are modulated by the vegetation cover, therefore the vegetation seasonality can be a key factor in the energy budget calculations in long-term integrations. However, the representation of the vegetation parameters, as the Green Vegetation Fraction (GVF), can as well be a challenging matter in land surface schemes. To overcome this limitation, products and vegetation indices derived from remote sensing have been used in land surface schemes. This study assesses the impact of two new sets of satellite-based GVF on land surface processes, using the version 3.4.1 of the NCEP Noah Land Surface Model (LSM), running offline at station sites located in Brazilian Amazonia. The GVF sets are based on two vegetation indices, the Normalized Difference Vegetation Index (NDVI) and the Enhanced Vegetation Index (EVI), both from the Moderate Resolution Imaging Spectroradiometer (MODIS). The hourly Satellite-enhanced Regional Downscaling for Applied Studies (SRDAS) outputs provide the atmospheric variables to drive the Noah LSM offline simulations, as well as the initial surface conditions, using both GVF datasets. SRDAS is a 25-km resolution downscaling of a global reanalysis that assimilates satellite-based precipitation rates, and employs a reformulated spectral nudging technique in the boundary forcing. This study focuses on the Amazon because its significance to the global climate, and its predominant vegetation type among Brazilian biomes. The Large-Scale Biosphere-Atmosphere Experiment datasets at station sites in the Amazon are used in evaluations of the offline simulations forced with monthly means from the two GVF datasets averaged over the 2000-2006 period. Due to the assimilation of precipitation in SRDAS, the precipitation forcing data show to be well correlated with gauge data. Results indicate that differences found in the offline simulations are mostly found from April to August. From Noah LSM simulations, the latent heat flux using EVI from MODIS exhibit higher linear correlation coefficient and lower root mean square error in comparison to the NDVI simulations. Further analyses are needed, nevertheless this approach to improve the seasonality of land surface fluxes in climate models has proven to be promising in areas with dense vegetation, such as Amazonia, and might provide better representation of the climate in those regions.